IN THE CLAIMS

	We claim:
1	1. A liquid crystal display, comprising:
2	a sapphire substrate having a first crystal lattice structure;
3	a single crystal silicon structure having a thickness no greater than about 100 nanometers affixed
4	to said sapphire substrate to create a silicon-on-sapphire structure, and a second crystal lattice
5	structure oriented by said first crystal lattice structure;
6	an array of liquid crystal capacitors formed on said silicon-on-sapphire structure; and
7	integrated self-aligned circuitry formed from said silicon layer which is operably coupled to
8	modulate said liquid crystal capacitors.
1 ·	2. The liquid crystal display of claim 1 wherein said sapphire substrate has an r-plane orientation
2	and said single crystal silicon structure has a (100)-orientation.

1	3. The liquid crystal display of claim 1 wherein each of said liquid crystal capacitors is coupled
2	to a transistor formed on said silicon-on-sapphire substrate.
1	4. The liquid crystal display of claim 3 wherein each of said liquid crystal capacitors is a nematic
2	liquid crystal capacitor.
1	5. The liquid crystal display of claim 4 wherein said liquid crystal capacitor provides a reflective
2	pixel element.
1	6. The liquid crystal display of claim 4 wherein said liquid crystal capacitor provides a pixel
2	element that is transmissible to light.
1	7. The liquid crystal display of claim 1 wherein each of said liquid crystal capacitors is a
2	ferroelectric liquid crystal capacitor.
1	8. The liquid crystal display of claim 7 wherein said liquid crystal capacitor provides a reflective
2	pixel element.
1	9. The liquid crystal display of claim 7 wherein said liquid crystal capacitor provides a pixel
2	element that is transmissible to light.
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1 10. A method for fabricating a monolithically integrated liquid crystal array display and control 2 circuitry on a silicon-on-sapphire structure, comprising the steps of: a) affixing a sapphire substrate having a first crystal lattice structure to a single crystal silicon 3 structure having a thickness no greater than about 100 nanometers and a second crystal lattice 4 5 structure oriented by said first crystal lattice structure to create a silicon-on-sapphire structure; b) ion implanting said single crystal silicon structure with a species selected from the group 6 7 consisting of silicon ions, tin ions, germanium ions, and carbon ions to create an ion implanted silicon layer; 8 9 c) annealing said silicon-on sapphire structure; 10 d) oxidizing said ion implanted silicon layer to form a silicon dioxide layer from a portion of said silicon layer so that a thinned, ion implanted silicon layer remains; 11

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e) removing said silicon dioxide layer to expose said thinned ion implanted silicon layer;

- 13 f) fabricating transistors wherein each of said transistors is formed by patterning said thinned ion
 14 implanted silicon layer to create a patterned silicon layer, growing a gate oxide on said patterned
 15 silicon layer; forming a polysilicon layer over said silicon-on sapphire structure; doping said
 16 polysilicon layer; patterning said polysilicon layer and said gate oxide to form a gate region and to
 17 expose selected regions of said thinned, ion-implanted silicon layer; ion implanting said selected
 18 regions of said epitaxial silicon layer to create source and drain regions in said thinned, ion19 implanted silicon layer that are self-aligned with said gate region;
- 20 g) fabricating electrical contacts that are electrically connected to said transistors; and
- 21 h) fabricating liquid crystal capacitors on said silicon-on sapphire structure that are electrically
 22 connected to said transistors by said electrical contacts.
- 1 11. The method of claim 10 wherein said sapphire substrate has an r-plane orientation and said 2 single crystal silicon structure has a (100)-orientation.
- 1 12. The method of claim 10 wherein said transistors include nonlinear circuit elements.
- 13. The method of claim 10 wherein said liquid crystal capacitors include nematic liquid crystal
 capacitors.

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1	14. The method of claim 10 wherein said liquid crystal capacitors include ferroelectric liquid crysta
2	capacitors.
1	15. The method of claim 10 further includes fabricating polarizers on said silicon-on-sapphire
2	structure.
1	16. The method of claim 10 further includes forming a layer of optical filters on said silicon-on
2	sapphire structure.
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1	17. The method of claim 10 includes the steps of:
2	implanting said silicon ions at a dosage of about 10 ¹⁴ cm ⁻² , at an energy level of about 185 keV and,
3	at a temperature of about -20°C;
4	immersing said silicon-on-sapphire structure in a nitrogen atmosphere having a temperature of about
5	550°C for approximately 30 minutes;
6	increasing the temperature of said nitrogen atmosphere in which said silicon-on-sapphire structure
7	is immersed from about 550°C to about 900°C in about one hour;
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- 8 annealing said silicon-on sapphire structure in said nitrogen atmosphere for about one hour at 900°C;
- 9 and
- oxidizing said silicon layer in an oxygen atmosphere having a temperature of about 1000°C.